



(12) **United States Patent**  
**Riester**

(10) **Patent No.:** **US 9,636,756 B2**  
(45) **Date of Patent:** **May 2, 2017**

(54) **MULTI-LIP DRILLING TOOL WITH  
INTERNAL COOLING DUCTS**

(71) Applicant: **Gühring KG**, Albstadt (DE)

(72) Inventor: **Christine Riester**, Sigmaringen (DE)

(73) Assignee: **Guehring KG**, Albstadt (DE)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 70 days.

(21) Appl. No.: **14/847,471**

(22) Filed: **Sep. 8, 2015**

(65) **Prior Publication Data**

US 2016/0059323 A1 Mar. 3, 2016

**Related U.S. Application Data**

(63) Continuation of application No. PCT/EP2014/055739, filed on Mar. 21, 2014.

(30) **Foreign Application Priority Data**

Mar. 21, 2013 (DE) ..... 10 2013 205 056

(51) **Int. Cl.**  
**B23B 51/06** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **B23B 51/06** (2013.01); **B23B 2250/12** (2013.01); **Y10T 408/455** (2015.01)

(58) **Field of Classification Search**  
CPC .. B23B 51/06; B23B 2250/12; Y10T 408/455  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,826,364 A \* 5/1989 Grunsky ..... B23B 51/06  
408/230  
9,216,460 B2 \* 12/2015 Matsuda ..... B23B 51/06  
2006/0006576 A1 \* 1/2006 Karos ..... B21C 23/147  
264/209.2  
2012/0082524 A1 4/2012 Matsuda et al.  
(Continued)

**FOREIGN PATENT DOCUMENTS**

DE 10 2009 024 256 12/2010  
EP 2 444 185 4/2012  
(Continued)

**OTHER PUBLICATIONS**

International Search Report (and translation) from a corresponding international patent application bearing a mailing date of Jun. 13, 2014, 4 pages.

*Primary Examiner* — Daniel Howell

(74) *Attorney, Agent, or Firm* — Burr & Brown, PLLC

(57) **ABSTRACT**

A multi-lip drilling tool is described, in which main cutting edge transitions in the region of the drill into a center lip section, wherein a cooling duct that leads to the drill tip is formed in each drill web. The invention minimizes tensile stress spikes in the chip flute base, while at the same time ensuring that a hitherto unachievable coolant/lubricant quantity gets to the engaged main blade. This is ensured by selecting a duct cross sectional form similar to an unsymmetrical kidney, in which it is ensured the selected radii of curvature for the individual boundary curve sections causes as much coolant/lubricant as possible to arrive at the blade or in proximity thereto in the fastest way via the point thinning and its edges intersecting with drill core.

**14 Claims, 3 Drawing Sheets**

